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Docket FRA 2003-15432 -5

Request For Waivers

Burlington Northern and Santa Fe Railroad Company

That which follows is intended not to impede what the Burlington Northern & Santa Fe Railway Company (BNSF) is attempting to achieve; but rather to challenge the Federal Railroad Administration (FRA) to clarify certain parts of the waiver docket; and for the FRA to issue any approval in the format of a **comprehensive detailed docket response**, in lieu of FRA, as stated, does not anticipate scheduling a public hearing. (Not dodging the issues, as the FRA did previously; such as their private letter "to proceed" as exemplified in their prior handling of the NAJPTCP request for waivers).

It is obvious, as presented by the BNSF waiver request; that at present, one is requesting permission to "start out with out a clue", and building a facility to achieve, at best, a facility not capable of achieving the level of "safety" developed by known technology which is "simple", "reliable""in compliance with all FRA Rules (without waivers), and capable of providing features not capable of being achieved by BNSF's vision, and such existing technology being in service with combinations of intercity trains as high as 125 and 150 miles per hour, mixed with vehicles of not less than six individual commuter agency vehicles as well as freight train movements of three individual railroads.

As previously mentioned, it is not the intention to impede BNSF's attempts to manage their own search for improved operation of their own property; never the less, as such concepts could be forced on other properties, at this juncture (start), there are certain ambiguities in the Waiver Docket that "cry for " attention. That having been said; that which follows is formatted by subject and/or category, rather than any attempt to generate a line by line dialogue of the original waiver docket, as follows:

Interested Person
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Safety to the Wind
Nothing Exists in Depth
Challange to Objectives
Risks and Liabilities
Record Requirement
Perminent Waivers
Review Abuse of Rules
Conflicts in Rules
Why are Certain Rules Cited
Variations (Communications,
Hardware, Obsolescence
Culture

Interested Person:

In making a response to the BNSF Docket FRA 2003-15432, this writer has conflicting interests Firstly, in favor of the BNSF interest in improving the integrity of their operations, as this writer has more than a minor financial interest in BNSF's well being; however with some sixty years experience in responsible situations in both the railroad and transit industries -- this writer has a strong feeling as to "Zero tolerance of Failures" (This comes from seeing "death" in the military - World War II - and "death" on the railroad). Having investigated serious accidents, some of which resulted in "death" only to find the basis was a signal cause, has instilled a strong belief in the significance of "vital". Even in Washington, no one has yet repealed "Murphy's Law"!

In the BNSF declared statement that the proposal at best, is non vital, there is a serious question as to any advantage that could possibly be gained for increased operating speeds for Passenger Trains and/or Trailer Van Trains (Section 236.0 (d), Part 236, Title 49 CFR). (It appears , for example Amtrak's trains # 347 and 348 operate on the Galesburg, IL to West Bushnell section, as indicated in the Docket).

That in respect to Sections of Part 218 (68FR55733) which states in part: "ETMS equipment on board a locomotive shall not be considered a "safety device" subject to this subpart at any time during the pilot program". From a Professional Standpoint, it will be a interesting issue to see just how this statement will be reversed, if the project reaches the step of being placed in revenue service.

Don't Know:

The "justifications" as presented as reason for request for a waiver from a specific rule, at times, demonstrate a lack of "institutional knowledge" As an example, Section 236.109 (Time Releases), the Rule is "brushed off" only on the

basis of the issue of "timing accuracy" (68FR55734); however, it is known there is an inherent second issue "on the purpose of the rule". One should recognize the typical "timing circuit" is an "open circuit" device, **not in accordance** with 236.5 (Design of circuits to be on a "closed circuit" basis); therefore the 236.109 also serves the objective to insure the "timing device" is intact, functional, **and does what is intended** when called upon.

On contrast with situations where there is apparent loss of "Institutional Background" in the Waiver Docket, there are situations some of which are mentioned elsewhere in this text, where the omission or distortions of "rules" appear "deliberate or intentional" (e.g. 236.504, 236.511, etc; where for example, the word **continuous** conveniently became lost). By omitting significant word(s) then one takes comfort in not having to face the issue, particularly as the "proposal" can never comply, not only in the test phase; but for ever more.

Now in a second direction , as to the theme "Don't know", responsible individuals on BNSF would appear to be content with "non-vital" concepts as a consequence of such arrangements as "Computer Matching" of Train Dispatcher's Train Orders to insure there is no overlap, and/or their confidence demonstrated in"BNSF's use of Low Band RF Packet Technologies for Safety Overlays"" (As presented 8 October '03 at "AREMA's" meeting in Chicago).

The background, and "level" of "cab signal" technology in the West presents a poor model, as "Books of Operating Rules" have excluded the significance of cab signals over track turnouts, and/or the necessity of Amtrak locomotives having to defeat their Continuous Cab Signal Speed Control Function when operating over railroad lines alleged to be cab signal equipped.

There is little or no background relative to such additional features as use of advance "code change points", "over run protection in interlockings", ability to "move out" and / or "prepare to stop" immediately (? seconds) while in the middle of the block, the ability to eliminate intermediate wayside signals operating exclusively on basis of cab signal display, the ability to have a matching "Speed Control" overlay on top of the cab signal package, etc.

There is a lot to be gained by enjoying the overlay of say 100 hertz energy (Now small package inverters to supply 100 hertz from local site battery) to the same code employed in modern(?) wayside packages arranged such as to eliminate wayside pole line wires.(-?- Universal Code Track Circuits , with cab signals, and no line wires on wayside, were in use as far back as 1935 -- Harrisbugh Division of the Pennsylvania Railroad).

Safety to the Winds:

The Waiver Docket specifically states this is a "non-vital concept" to be only as a "safety net" for train performance retaining the **"existing systems as primary means of control"**. **That it also states",,on board display of signal aspects,** on board display of **monitored** switches,,". Now here as we feel one can supplement the enginman's performance, **it is equally true,, that one can also "mislead the engineman" (As a consequence of employing a known non-vital parallel installation in the locomotive cab.**

The majority of waivers of the rules requested are in themselves requesting relief from fundamental safety issues, concerning which the FRA impose "penalties and fines" upon others **for non compliance.**

Nothing Exists In Depth:

Nothing in the Docket spells out in any depth as just how this endeavor is to be implemented; in fact, on the other hand, it spells out the necessity to have unbridled freedom of "trial and error" in every respect of the project. As will be noted, in a subsequent section "Conflict in Rule Statements", we are faced with "something"; but from the Docket Request , one is left in "Figgy Bottom".

Other ambiguous statements, such as on board display of **"monitored"** switches are "weasel words"(CBTM comes to mind, where the authors conceded that the concept did not include protection of wayside hand operated track switches". Take note current modern continuous cab signal technology protects individual hand operated track switches, as do also most quality wayside signal systems;**therefore we are presented with a typical conflict situation** between the enginman's position and a conflicting aspect in the cab from the "ETMS" concepts.

Challenge to Objectives:

The premise of the Docket states that the "existing systems as a primary means of control" (68FR55732); but now one faces the engineman with a non-vital conflicting "cab signal aspect" (which as conceded, will not validate all wayside conditions) on top of which states: "ETMS will have the function to independtly apply brake application".

Just from past experience elsewhere, an outside supplier attempted to employ a "single wire" -- "telephone type relay" as an interface between a computer drive and a locomotive brake system. In such a situation, where is the FRA, as no rules cover, yet from a "safety issue", it is serious? As the concept is "non-vital" does that authorize short cuts and/or less stringent methods??

Risks and Liability:

The Docket as presented, concedes certain risks are possible; but in so doing, provides a basis for an aggressive plaintiff's Attorney: "You knew or should have known".

Four types of risks come to mind (a) The engineman who inadvertently accepted the ETMS cab indication, (b) The typical inability of ETMS to provide warning to an engineman of a hazard , in any timely manner, of a hazard which indiscrimately appeared in the face of the oncoming train, (c) Risk to a train's performance, due to an inadvertent or unexpected brake application, which over rode an engineman's responsibility for proper train handling, (d) The lack of control by railroad management over the various modes and components of the proposed facilities.

As for (a), the enginmans conflict, as a typical example: The wayside signal the engineman could not be too sure of, due to say "sun glare" or "inattention", then leaning on theETMS's cab signal aspect (and or information). (Confusion in the Docket - one place it speaks of a "cab signal display, while else where it addresses "identifiation of a signal", and else where it states "no signal aspect).

As to (b), various attempts to provide a "modern system" have an inherent flaw , in their inability to appropriately warn an engineman , in a timely manner, of an unexpected hazard that might appear in his approaching route. For example, in MIchigan, the touted system can take up to 23 seconds, in processing a situation through all the components and links before the approaching (at 90 miles per hour) engineman has any alert of trouble ahead. The NAJPTCP effort, after some six years and in excess of 70 million dollars, is not there yet, so as to achieve a limit of two seconds to get the word to the engineman (Which is todays performance with existing technology), for the NAJPTCP is an unknown. CSX with their CBTM, by their own project presentation, just does not have the capability. For the ETMS, the situation is up for grabs. For a conventional wayside signal system, any alert of trouble ahead, is lost after passing a wayside signal until approaching the next wayside signal.

For ETMS, in respect to the comment, its ability to respond to any hazard ahead, as being up for grabs, is laid out in the Docket. When the text talks of **monitored switches**(read, not all of them), and the discussion of say--236.511, which states "ETMS is not an automatic cab signal system and will have no connection to a signal system, but will receive input from the signal system and will display the signal name that forms the basis for limits of authority will be depicted on the display" (68FR55734). Essentially, if a spill of a train on an adjacent track spreads out and fouls the adjacent track and

its track circuit,involving an intermediate wayside signal (Which is an emergency disruption of a train's authority) then the ETMS concept would appear to remain blissfully silent.

As to risk previously indicated by (c), as to inadvertent brake application of a train brakes, brings to mind that an "undelivered message will stop the train at the end of its active authority". "The locomotive segment confirms the locomotive location and enforces a train's movement and speed and applying the brake to stop the train if necessary to prevent a violation" (68FR55732).

Now add to this, in respect to the locomotive, Section 236.5, which as justification -- states:

> "ETMS is composed of solid state components that are software driven. Neither the hardware nor software can technically be designed to meet this section".

BNSF having said a computer driven device can not comply with the **level of safety** outlined by 236.5; now as the engineman is responsible for the manipulation of his air brake (The average Road Foreman of Engines might say it is an "Art"), partictcurly with undulating grades, a down grade on a curve with lightly loaded cars behind the locomotive(s), a "kicker" in the train (to nurse), a brake application on top of a brake application already in place, tec, then he is in the position **of having an unwanted inadvertent** brake application on top of the engineman's responsibility -- which
can result in not only unwanted delays; but under some situations , could result in a derailment or pull apart of the freight train.

To add to the "risk" of conflict between the "vital" wayside signal and the function of ETMS in the cab of the locomotive, attention is invited to say, the "fuzzy" justification of 236.504 (68FR55734) (Continuous inter connection with the signal system) where it is **implied** that the ETMS scheme will obtain its intelligence from the dispatcher's control; but here again, the status of information in the field, has not necessarily required a "vital link" between the field and the dispatcher; therefore if we combine the "dispatcher" information as "infallible; then we are adding one more "risk" for inadvertent discrepancies between the wayside signal system and what the locomotive is told, thus that influences potential unexpected brake problems as well (over and above within the locomotive's on board computer mis-steps).

The forth issue (d), managements loss of control, has two primary issues. One is the lack of control over the radio spectrum --- and second,if need to diagnose a

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failure, not necessarily quick;y by a single man in the field; but rather solutions by committee (with resultant delays).

It might be appropriate to check use of the radio spectrum for what ever frequency might be contemplated; particularly if use of one pair of the frequencies in the 900 megahertz spectrum previously allocated to the ARR; as to the extent of any conflict with , or possibly overlap with the parallel NAJPTCP efforts, Springfield ,IL - south. No matter where the ETMS efforts might be in the radio spectrum, what means exist for BNSF to effect a cure?? The limited clearances of a locomotive, and the inability to employ height as a means of antenna isolation, creates an interesting problem , for now what appears to be developing, an antenna farm?? (For those who read the Air Force Times, it was of interest to note, in the present conflict, there was local interference with the Global Positioning System (GPS), which was created by transmitters made for the purpose (from Russia ??) which caused the military to employ elaborate search methods to fine the offenders).

As the BNSF Docket, in more than one place, stated the uncertainties that could be expected in solid state software driven hardware; thus can one be sure any malfunction will be easy to correct?(to say nothing of the added situations which arise at times -- say with change of environmental conditions - heat - cold-- et all).

The question of Liability is particularly serious as an aggressive [illegible] Plaintiffs Attorney can present a "Case History" of a situation of a railroad property having lost a personal injury suit, on the basis that they failed to exercise "prudent judgement" in the way an instigation was made, as contrasted with other alternative available to them.

Record Requirement:

The BNSF Docket requests relief from record keeping. Rather than grant a "blank check" (not to keep records), the FRA should not repeat the same blunder as they did in the earlier BNSF - UP effort and expenditure of nine million (plus over run) in searching for a "Modern Positive Train Control" in the Pacific Northwest ("Kelso"); when having given a waiver as to record keeping; after the drop [illegible] the earlier issue predicated evidently upon "Their Board of Directors indicated the cost figure was too high as contrasted with other priorities". The FRA were left with the simple statement of "costs", there being no "papers" or analysis of the earlier BNSF - UP efforts.

If the FRA waives record keeping, taken literally, what mechanism is in place to evaluate the exploratory efforts to develop the concept of ETMS; for the FRA to evaluate and/or educate the FRA as to what action to take in the future if

BNSF in analysis for a final decision "on basis of safety" or go into revenue service(with recognition of those waivers they will have to justify as being **permanent**.

If the FRA would accept the EMTS concepts and endeavor to impose them on others; then other properties are entitled to have performance data to evaluate the concepts and/or built towards a new common objective, rather than all locomotives operating in relay service , having a full assortment of whistles and bells for each property they operate over. (or else are we going to say "good by" to the efficiency of "relay trains"??).

Permanent Waivers:

The FRA must determine those waivers requested, that out of necessity would become permanent. In doing so there must be not only the impact on "safety" in granting, that, , that it is not considered a "safety **device**" (as to testing), places the onus on the FRA, as to why it would be a "safety issue" on some operations and not on others -- this would also force a revaluation of the premise to justify tables of "fines" and "penalties" for non observance of the rules.

That the Docket states the proposal is "non-vital" and goes on to say, in response to Sections of Rule 228, that it is not considered a "safety device" (during the testing period) . To expect the FRA to "reverse" that statement, it would place the onus on having comprehensive test results in order to have some confidence not only to reverse that stated in respect to sections of Part 228; but in granting permanent waivers as required as well.

Review Abuse of the Rules:

The BNSF in requesting various waivers, have not cited the full significance of the individual rules from which they seek a waiver. For example (68FR55734, in citing the intent of the rule for which they seek relief; they conveniently omit the word **"continuously"**; therefore their breif cite should have read in part: ",,,**Cab Signaks <u>continuously</u> controlled in accordance with block conditions stopping distance in advance,,"**.

Now as a consequence, not just once, the BNSF having streamlined the significance of the original rule, the justification only responded to the streamlined version.

That the FRA accepted and published the Docket from BNSF without noting such discrepancies, makes them an accessory to the issue.

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Conflicts in Text:

On BNSFs preface (68FR55732), for example, they signals involved with cab temporary signal aspects,,"; while in justification discussion, in particular Section 236.23 (68FR55733), the Docket contradicts its self as it states: the ETMS design excludes any visual display of signal aspects, or indications (Again other conflicts with description on display as to signal at end of authority)

The treatment by BNSF talks only, evidently, of the ETMS forcing compliance only to "Home Signals" and/or signals involved in a temporary speed restriction; but 236.504 **applies to each and every signal**, which in automatic block **every signal** is the trains authority; thus of an intermediate signal is inadvertently at a restricting signal, such as a broken rail, wayside switch molested, run away car, accident, et all, then the ETMS concept appears will not work or recognize it, nor originate an enforcement requirement on the engineman. This is possibly just another case where the rule cite and justification omit the concept of **continuous**; where the original 236.504 require a system to enforce compliance if not acknowledged or responded to -- Note - at every signal. These are not an all inclusive analysis ; but rather just examples, to cite the distortion in the original Docket.

Why are certain Rules Cited???

The Docket FRA 2003-15432 is structured as a request for waivers from certain specific rules of the FRA; however, in some instances(68FR55735), such as rules 236.503, 236.505, 236.506, 236.507, et all, the text is not asking for a waiver; but rather states that they intend to comply.

With this change of format, to indicate those rules with which **they will comply**; does that mean, those are the only rules of which they will comply, and/or **what about all that** contained in the **733pages** of Parts 200 to 268, as printed in the October 1, 2002 issue of those parts of Title 49 CFR (USGovt Printing Office)???

Variables (Communications, Hardware,Obsolesce):

Starting on the premise the depreciation rate for signal equipment is in the realm of 33 years, BNSF is faced with the thought that their commitment of dollars as a capital expenditure will not survive the depreciation period without added expenditures,almost three incidents,during the depreciation period.

For starters, see if you can obtain at least 8 or 10 years commitment for "support" and guarantee of each facet and hardware of that which goes into ETMS - on board - the wayside- the office - links,etc.

From the standpoint of communications,The concept of the Global Positioning System (GPS) and its satellites only have an 8 to 10 year life, before they fall out of orbit, and have to be replaced.The eight or so spares in the sky; also have the same life expectancy as those they support. A publication for "surveyors" has lamented the risk of congress suggesting a tax on "receivers" to help pay for the system. Also the next generation are expected to have improvements, and it is not certain that present receivers will be compatible.

The FRA, themselves have a conflict of interest, as they have taken upon themselves, as an added task, and added GPS to their budget. The concern for BNSF is that recently, only 26 of the 74 dual coverage sites provided by the Nationwide Differential GIobal Position System (NDGPS), to provide improved position accuracy to receivers capable of receiving the differential correction signal. It is estimated, funding being available, the 48 remaining sites will be completed by 2014 (In seeking funds, the FRA are credited with saying, that they were taking every action within its program authority and available budget authorities to advance the development of technology that would achieve PTS and related safety functions , which together are referred to PTC.

Further as to GPS , do not overlook the opportunity to call 1-703-313-5907 for a recording of GPS satellites "out of service". (It varies from none to three at various times - essentially the need to take each unit out of service to reprogram ; for as they slowly drift out of orbit, they no longer have accurate sense as to where they are at any instant in time).

GPS is not alone, at risk of revision and replacement. For the second time, the Federal Communications Commission are in the act of "Narrow Banding" the VHF (Very High Frequency) Band (In the 160 MH range, the frequency employed by the railroad industry), as outlined in their Docket WT 99-87, RM 9332, FCC 03-34 (68FR42296 thru 422304); to be in force in various steps effective January 1, 2005, January 1, 2008, January 1, 2013.

It will be interesting to see how the redesign of equipment required, as the last narrow band exercise brought into place"Compression" and "Expansion" circuits to provide the desired volume range, in spite of the original frequency deviation allowed on the first narrow band orders. (This could have an interesting impact on schemes of data over voice on the same railroad channel at the same time in the VHF spectrum).

The thought here, as the FCC are continuing to modify "services" to maximize use of available radio frequency spectrum -- What next? And at what cost??

As to material, today, in our ever changing market place of technology, the average firm states its Research and DEvelopment will come up with a new item after three years, at which time they will have saturated the market place with their prior item. With no interest in the "after market", with new items, lays the foundation of corporate "growth" (Anybody interested in reports to stockholders?? e. g. Motorola -)

Culture:

It seems after "Kelso", that the BNSF and UP, having been forced into an internal program to find a solution for a "Modern Positive Train Control" and also the loss of funds, time and efforts, in having rejected the AIRINC - ARR concepts of AIRES, et all, that today the BNSF might be both skeptical and very cautious.

The BNSF , having the position of being on the receiving end of many of this response , most intended to be constructive, raises another issue of speculation -- it would be of interest to know exactly who wrote the original docket that ended up in print.

An expanding item of culture, industry wide, are those who attempt to add other missions to the concept of Train Control, to assist in spreading the costs around to others;however the original priority and responsibility laid in locked boxes, with assigned qualified individuals, whose work , say in a locomotive , was "signed off"; thus tightening the lines of responsibility, et all - on the locomotive, train control (cab signals) is in part 236, not say 229. In this Docket, it was interesting to note no request was made for a waiver for section 236.3 (Locked Signal Cabinets) as that applies to the locomotive as well.

Belknap Freeman,PE
Rosemont , PA
22 October 2003

cc:
BNSF
Greg Stengem
Vice Pres - Safety, Training,
and Operations Support

As you were designated by Mr Rose, in his letter of Sept 19, for any further questions of ETMS.